AI-POWERED DEFORESTATION DETECTION

Using Satellite Imagery

Group 25

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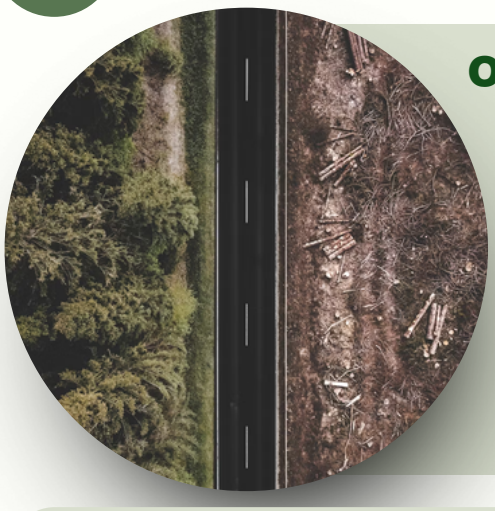
Deforestation Monitoring | Image Segmentation | AI for Environmental Protection | EU regulations

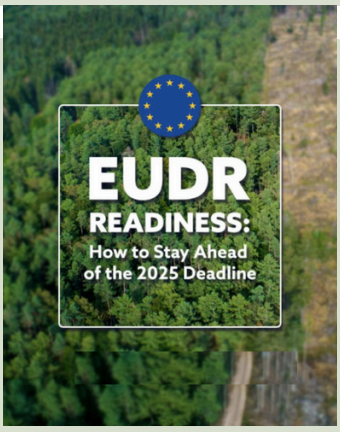


Objective

Deforestation is a significant driver of biodiversity loss and climate change. According to Our World in Data, deforestation has led to the loss of over 10 million hectares of forest annually in recent years, primarily driven by agriculture, logging, and infrastructure expansion [1]. Recognizing the urgency of this issue, the European Union has introduced the EU Deforestation Regulation (EUDR), which mandates stricter tracking and reporting of deforestation-linked resources [2]. This project aims to develop an AI-powered segmentation model to distinguish forests from non-forested areas in satellite images. This would lay the foundation for tracking land cover changes, which can later be integrated with a classification model to assess deforestation trends.

Scope

The dataset used originates from the DeepGlobe 2018 Land Cover Classification Challenge, based on satellite imagery from Thailand, Indonesia, India, Bangladesh, and parts of the Middle East & North Africa. The dataset is a subset consisting of patches in a lower resolution than the original and does not include geolocation metadata. To make this model applicable for real-world deforestation monitoring future steps will be needed to integrate the satellite images from the Google Engine to track land cover changes over time. The idea behind the final model is that it should enable detection of deforestation in high-risk regions and help businesses in the wood industry comply with EUDR regulations.



First Step: Train a segmentation model to accurately detect forests from satellite images.

Next Step: Combine the segmentation model with time-series satellite imagery to analyze forest cover changes over time.

Future Use Case: Apply this model to real-world deforestation tracking to help businesses comply with EUDR regulations.

Data Foundation

DeepGlobe 2018 Dataset [3]
High-resolution satellite imagery for land cover segmentation.

Google Earth API - Sentinel 1 satellite [4]
Retrieving historical satellite data for detecting land-use changes over time.

ABA Topics Applied

Computer Vision & Deep Learning
Training a Convolutional Neural Network using a U-Net architecture to segment forest areas in images.

API-Based Data Retrieval
Retrieving satellite images through API integration.

Explainable AI elements
If time allows explore explainable AI techniques.

References

[1] Our World in Data, 2024

[2] European Commission. (2024). EU Regulation on Deforestation-Free Products.

[3] Paper reference: (Demir et al., 2018) Access: Forest Aerial Images

[4] Google Earth Engine. (2024). Google Earth Engine Developer Guide.

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